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A study on musculoskeletal morbidity among professionals in information technology hub, Salt Lake City, Kolkata.

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Abstract

Background: Long periods of working at a computer as most people do, can cause musculoskeletal problems, eyestrain, obesity, occupational stress and overuse injuries of the hands and wrists which can be reduced or eliminated with proper workstation design and improved posture. The daily experience is of repetitive, intensive and stressful work, which frequently results in employee "burnout". Using the wrong chair or just sitting improperly in front of a computer for long time can lead to chronic debilities such as stiffness, headache, and backache. Muscles and tendons can become inflamed due to excess periods of sitting on computer. Carpal tunnel syndrome is a common example of an overuse injury associated with computer work caused by pressure on the main nerve that runs through the wrist. The fingers are also prone to overuse injury, particularly the finger that clicks the mouse buttons. With this backdrop a study was conducted to find out the musculoskeletal morbidity among professionals in Information Technology hub of sector V, Kolkata.

Methods: This was an observational, cross-sectional, institution based study was conducted to find out morbidity among information technology professionals at Sector V, Salt Lake City, Kolkata, from May 2015 to April 2016.

Results: Among 244 information technology professionals, their age ranges from 23 years to 39 years and mean age was 27.7 years. Male (186) 76.2 %, Female (58) 23.8 %, Married (65) 26.6%, Unmarried (172) 70.5% and living together (07) 2.9%, Graduate (84) 34.4%, Post graduate (160) 65.6%. Smoker were (96) 39.3% and Alcoholic (113) 46.3%. Type of job among study participants were; Management (08) 3.3%, Data processor (66) 27%, Call centre executive (37) 15.2%, Software developer (133) 54.5%. Prevalence of musculoskeletal symptoms were; wrist/hands 25.8%, elbow 30.7%, shoulder 37.7%, neck 61.9%, upper back 33.2%, lower back 52.9%, hip/thigh 29.9%, knee 32%, and ankle/feet 29.1%. Musculoskeletal symptoms were increasing with age OR=2.62 (1.4-5.1), male having more symptoms OR=7.2 (3.6-14.4), job duration more than 2 years had more morbidity OR=2.2 (1.1-4.4), smoker were associated with more symptoms OR=9.4 (3.3-27.2) and professionals, who had better ergonomic score were less morbid OR=0.86 (0.7-0.9).

Conclusion: On the basis of findings of study as young generation who are doing job in IT companies lead to sedentary life, poor life style related behavior, musculoskeletal morbidity. Poor ergonomic practices lead to musculoskeletal morbidity among older age group, male sex and who were working for more than 2 years.

Keywords: VDT, IT professionals, Ergonomic practices, Nordic questionnaire.

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Introduction

In twenty-first century, computers have become almost as ubiquitous as the humble pen and paper in many peoples' daily life. There are approximately six computers per thousand populations with an installation of 18 million personal computers (PC's) and their number is increasing all the time [1].

The computer is a vital tool in every dimension. However,

the long periods of working at a computer as most people do, can cause musculoskeletal problems and overuse injuries of the hands and wrists which can be reduced or eliminated with proper workstation design and improved posture. The proliferation of video display terminals (VDT), in the modern office setting has generated concern related to potential health hazards associated with their use [2].

Using the wrong chair or just sitting improperly in front of a computer for long time can lead to chronic debilities such as stiffness, headache, and backache. Muscles and tendons can become inflamed due to excess periods of sitting on PC's. Carpal tunnel syndrome is a common example of an overuse injury associated with computer work. This painful disorder of the hand is caused by pressure on the main nerve that runs through the wrist. The fingers are also prone to overuse injury, particularly the finger that clicks the mouse buttons [3].

Employees who start to feel the "pressure to perform" can get caught in a downward spiral of increasing effort to meet rising expectations with no increase in job satisfaction. The relentless requirement to work at optimum performance takes its toll in job dissatisfaction, employee turnover, reduced efficiency, illness and even death [4].

Absenteeism, illness, alcoholism, tobacco use "petty internal politics", bad or snap decisions, indifference and apathy, lack of motivation or creativity are all by-products of an over stressed workplace [5]. Chemical exposure from well-furnished wall and furniture, smoking habits etc. may leads to respiratory problems. Sedentary activity, improper food eating habit with high prevalence of alcohol consumption and smoking lead to development of musculoskeletal, ocular, systemic disorder and non-communicable disease among IT workers.

India has been in the forefront in cyber world with IT industry developing into a major service provider. The primary service providers in Information technology (IT) industry are grouped into IT software industry; IT enabled service, Internet and e-commerce. There are approximately 916 IT providers registered with National Association of Software and Service Companies (NASSCOM) all over India.

Owing to recent bloom in the economy in Kolkata and also the state as a whole, West Bengal is now the 3rd fastest growing economy in the country and the city's IT sector is growing at a rate of 70% per year; twice the national average. Around 2 lakhs people are employed in different companies in Kolkata.

IT professionals are emerging with the group of modern occupational diseases which are slowly taking their roots among them. Repetitive, intensive and stressful work daily results in employee burnout. This study is concerned with how the Information technology and the consequent change in job culture affect their work related morbidity among professionals. This is particularly relevant because jobs in Information technology are the most coveted one in modern India, and the most brilliant section of the youth are going for it. Even leaflets for their stretch and exercise breaks during work are available; they were not doing the same. As only few studies were done for musculoskeletal morbidity among IT professionals of Kolkata; this study was necessary to determine the prevalence of musculoskeletal morbidity along with associated factors among Information technology professionals and application of this knowledge to prevent the disease burden among them in Kolkata, West Bengal. With this backdrop a study was conducted to find out the musculoskeletal morbidity among professionals in Information Technology hub of sector V, Kolkata.

Materials and Methods

Type of study

This was an observational, cross-sectional, institution based study.

Study area

Sector V, planned hub of information technology is situated in Salt Lake City, Kolkata.

Study settings

The study was conducted in 3 information technology companies of sector V at Salt Lake City in Kolkata.

Study period

Data was collected for 1 year from May 2015 to April 2016.

Study population

People, who were engaged to computer related work from software developers, call center and data entry /processing, comprised our study population.

Selection criteria

Information technology professionals, male and female, who were working in different companies, at Sector V were considered.

The participants, who were working in the current job for past six months and also working on the computer for at least 3 h/day or 15 h/week, were included in the study.

Exclusion criteria

Subjects who did not give consent were excluded from the study.

Sample size

In a recent study done at Mumbai [6], it was found that prevalence of psycho-social problems in the form of stress among IT workers is 44% in India. This was the least among all the other morbidities suffered by the IT professionals. Now considering this prevalence with 20% allowable relative error, sample size becomes approximately 244 after applying the formula

Sample size = $Z^2 1\text{-}\alpha/2pq/L^2$

Where, $Z_{1-\alpha/2}$= Standard normal deviate at a desired confidence level (95%); p = previous prevalence; q=100–p; L=allowable error, 20% of p taken. At 95% confidence

level $Z_{1-\alpha/2}$ value is 1.96.

Sample size=122, since it was a multistage study, design effect of 2 was considered; so, final sample size came to 244.

Sampling design

Around 2 lakhs people are employed in different information technology (IT) companies at sector V and sector III of Salt Lake City in Kolkata. At first stage Sector V were selected randomly for selection of IT professionals. At second stage, 3 companies were selected out of 30 companies at Sector V (Simple Random Sampling without replacement) at Salt Lake City. First, second and third selected IT companies employed 600, 400 and 300 professionals respectively; among them 113, 75 and 56 adult professionals were chosen from each company by probability proportionate sampling with random table method to include in the study (Multi-stage sampling technique). Thus 244 participants were selected for the study [7,8].

Study Tools and Technique

Study tools

1. Pre-designed, pre-tested structured schedule (Two parts; part I elaborating the socio-economic and job related health behavior and part II deals instruments to elicit musculoskeletal morbidity (Nordic) questionnaire and ergonomic checklists).
2. Stethoscope.
3. Portable weighing machine (Digital).
4. Non stretchable measuring tape (Calibrated in 1 cm).
5. Sphygmomanometer.
6. Previous medical records.
7. List of employees obtained from the organization.

Technique

1. Interview of the study subjects.
2. Self-administered questionnaire
3. Clinical examination and investigations.
4. Record analysis (Reviewing the previous medical reports).

Data collection procedure

The purpose of the study was explained to all the participants and they were assured of confidentiality. After obtaining informed consent for participation in the study, the questionnaire was administered. The questionnaire was used to collect information regarding socioeconomic status, demographic and behavioural characteristics along with participant's morbidity profile. Anthropometric data was collected along with blood pressure measurement [9,10].

Ergonomic scoring

An ergonomic checklist was adapted from various questionnaires (occupational health clinics for Ontario workers, WISHA services division, Washington state department of labor and industries, MMERT).

There were 43 questions related to ergonomic practices (keyboard, mouse, monitor, accessories, chair, and workstation design along with job satisfaction). Favorable practice is taken as 1 and unfavourable practice as 0. Maximum attainable score was 43 and minimum attainable score 0. Score ranges from 0 to 43, with higher scores indicating decreased level of musculoskeletal morbidity.

Statistical analysis and plan

Data was analysed using appropriate statistical methods and represented by various tables, graphs, diagrams etc. and various statistical significant tests were applied accordingly with the use of SPSS software (version 16.0).

Results

For the multivariable model, the Hosmer-Lemeshow test gave a Chi-square value of 8.67 (p=0.37, not significant)

Table 1. *Distribution of study subjects according to socio-economic and demographic characteristics (n=244).*

Variables		Frequency (n)	Percentage (%)
Age (in years) Mean ± SD (27.7 ± 2.88)	21-25	48	19.7
	26-30	158	64.8
	31-35	33	13.5
	>35	05	2.0
Sex	Male	186	76.2
	Female	58	23.8
Education level	Graduate	84	34.4
	Post graduate and above	160	65.6
Marital status	Married	65	26.6
	Unmarried	172	70.5
	Others (living together)	07	2.9
Stay with family	Yes No	57 187	23.4 76.6
PCI (in rupees)	6001-10000 66 27.0 10001-14000 76 31.1 14001-18000 46 18.9 18001-22000 56 23.0		

indicating good model fit. Nagelkerke R^2 was 0.31.2 showing that the variables included in the model predicted 31% of the musculo skeletal morbidity.

Results are given in Tables 1-7.

Discussion and Conclusion

Among 244 information technology professionals, their age ranges from 23 years to 39 years and mean age was 27.7 years. Similar finding were found in Hong Kong based

Table 2. *Distribution of behavioral characteristics of study subjects (n=244).*

Parameters	Total No. (%)	Management No. (%)	Data processor No. (%)	Call center executive No. (%)	Software developer No. (%)
Daily time spent on social network (in hours) [n=233]					
≤ 3	173 (74.25)	04 (2.3)	47 (27.2)	22 (12.7)	100 (57.8)
>3	60 (25.75)	02 (3.3)	19 (31.7)	14 (23.3)	25 (41.7)
Use of transport predominantly					
Own vehicle	45 (18.44)	01 (2.2)	14 (31.2)	11 (24.4)	19 (42.2)
Public transport	199 (81.56)	07 (3.5)	52 (26.1)	26 (13.1)	114 (57.3)
Eating habit of professionals at office					
Home food	171 (70.08)	05 (2.9)	56 (32.8)	27 (15.8)	83 (48.5)
Outside/ street food	35 (14.34)	01 (2.9)	04 (11.4)	03 (8.6)	27 (77.1)
Canteen food	38 (15.58)	02 (5.3)	06 (15.8)	07 (18.4)	23 (60.5)
Substance use[#]					
Smoking	96 (39.34)	03 (3.1)	36 (37.5)	14 (14.6)	43 (44.8)
Alcoholic	113 (46.31)	04 (3.5)	42 (36.8)	16 (14.1)	52 (45.6)
Not exercising	95 (38.93)	01 (1.1)	35 (36.8)	12 (12.6)	47 (49.5)
#multiple response					

Table 3. *Distribution of study subjects according to job characteristics (n=244).*

Parameters	Total number	Management No. (%)	Data processor No. (%)	Call centre executive No. (%)	Software developer No. (%)
Years of working					
1 year	106	2 (1.9)	25 (23.6)	15 (14.2)	64 (60.3)
1 to 2 years	59	3 (5.1)	16 (27.1)	10 (17.0)	30 (50.8)
>2 years	79	3 (3.8)	25 (31.6)	12 (15.2)	39 (49.4)
Additional work in last 6 months					
Office job at home	133	05 (3.8)	43 (32.3)	22 (16.5)	63 (47.4)
Night shift	51	-	19 (37.3)	06 (11.7)	26 (51.0)
Number of night shift in last 6 months [*]					
<8	12	-	04 (33.3)	02 (16.7)	06 (50.0)
≥ 8	39	-	15 (38.5)	04 (10.3)	20 (51.3)
[*]51 subjects					

Table 4. *Distribution of the IT professionals according to the musculoskeletal morbidity (n=244).*

Musculoskeletal discomfort [*]	Last 12 months No. (%)	Last 7 days No. (%)
Any musculoskeletal problem (in either side)		
Trouble in wrist/hands (in either side)	63 (25.8)	63 (25.8)
Trouble in elbow (in either side)	75 (30.7)	67 (27.5)
Trouble in shoulder (in either side)	92 (37.7)	77 (31.6)
Trouble in neck	151 (61.9)	147 (60.2)
Trouble in back, any site		
Upper back	81 (33.2)	45 (18.4)
Lower back	129 (52.9)	120 (49.2)
Trouble in leg (in either side)		
Hip/Thigh	73 (29.9)	60 (24.6)
Knee	78 (32.0)	57 (23.4)
Ankle/Feet	71 (29.1)	55 (22.5)
[*]multiple responses		

Table 5. *Distribution of smoking habit with different variables among IT professionals (n=244).*

Variables	**Smoker (n=96)** (last 6 months) No. (%)	**Non smoker (n=148)** (last 6 months) No. (%)	**Total**
Age (years)			
21-25	03 (3.1)	45 (30.4)	48
26-30	72 (75.0)	86 (58.1)	158
31-35	20 (20.8)	13 (08.8)	33
>35	01 (1.1)	04 (02.7)	05
Sex			
Male	83 (86.5)	103 (69.6)	186
Female	13 (13.5)	45 (30.4)	58
Type of work			
Management	03 (3.1)	05 (03.4)	08
Data processor	36 (37.5)	30 (20.3)	66
Call centre executive	14 (14.6)	23 (15.5)	37
Software developer	43 (44.8)	90 (60.8)	133
Marital status			
Currently married	17 (26.2)	48 (73.8)	65
Never married	79 (45.9)	93 (54.1)	172
Others	-	07 (100)	07
Night shift duty			
Yes	35 (68.6)	16 (31.4)	51
No	61 (31.6)	132 (68.4)	193
Living with family			
Yes	02 (3.5)	55 (96.5)	57
No	94 (50.3)	93 (49.7)	187
Smoking family history			
Yes	35 (43.8)	45 (56.2)	80
No	61 (37.2)	103 (62.8)	164

Table 6. *Distribution of alcohol consumption with different variables among IT professionals (n=244).*

Variables	**Alcoholic (n=113)** [last 6 months] No. (%)	**Non alcoholic (n=131)** [last 6 months] No. (%)	**Total**
Age (years)			
21-25	09 (8.0)	39 (29.8)	48
26-30	79 (69.9)	79 (60.3)	158
31-35	23 (20.4)	10 (7.6)	33
>35	02 (1.7)	03 (2.3)	05
Sex			
Male	92 (81.4)	94 (71.8)	186
Female	21 (18.6)	37 (28.2)	58
Type of work			
Management	04 (03.5)	04 (03.1)	08
Data processor	42 (37.2)	24 (18.3)	66
Call center executive	16 (14.2)	21 (16.0)	37
Software developer	51 (45.1)	82 (62.6)	133
Marital status			
Currently married	24 (36.9)	41 (63.1)	65
Never married	89 (51.7)	83 (48.3)	172
Others	-	07 (100)	07
Night shift duty			
Yes	35 (68.6)	16 (31.4)	51
No	78 (40.4)	115 (59.6)	193
Living with family			
Yes	11 (19.3)	46 (80.7)	57
No	102 (54.5)	85 (45.5)	187
Mostly which days of week			
All days of week	34 (30.1)	...	34
Weekend	79 (69.9)	...	79

Table 7. *Association of musculoskeletal morbidity with different determinants (n=244), the variables already found significant in bivariate analysis were entered into a Multivariable Logistic model.*

Variables	MSD present (%)	OR (CI)	AOR (CI)
Age (years) median: 27			
≥ 27	122 (87.1)	2.62 (1.36-5.04)*	2.22 (1.02-4.81)*
<27	75 (72.1)	1	1
Sex			
Male	166 (89.2)	7.22 (3.60-14.4)*	4.88 (2.27-10.51)*
Female	31(53.4)	1	1
Job duration (year)			
>2	84 (87.5)	2.17 (1.06-4.41)*	1.23 (0.54-2.82)
≤ 2	113 (76.4)	1	1
Smoking			
Smoker	92 (95.8)	9.42 (3.26-27.24)*	5.15 (1.69-15.64)*
Non smoker	105 (70.9)	1	1
Ergonomic score	...	-0.86 (0.76-0.96)*	-0.92 (0.81-1.05)
*statistically significant (p<0.05)			

study where mean age was 26.1 year. This study finding was: Male (186) 76.2%, Female (58) 23.8%, Married (65) 26.6%, Unmarried (172) 70.5% and living together (07) 2.9%, Graduate (84) 34.4%, Post graduate (160) 65.6%. Smoker were (96) 39.3% and Alcoholic (113) 46.3%. Kolkata, India based study 10 had different finding as Male 54.4%, Female 45.6%, Married 59.2%, Unmarried 39.8%, Graduate 91.7%, Post graduate 8.3%. Smoker was 33.5% and Alcoholic was 23.3% due to different study setting and design. Type of job among study participants were; Management (08) 3.3%, Data processor (66) 27%, Call centre executive (37) 15.2%, Software developer (133) 54.5% which was different as shown in Kolkata, India based study 10 i.e., Management 6.8%, Data processor 60.7%, Call centre executive 7.8%, Software developer 24.7% due to different socio economic condition of professionals and study settings. Prevalence of musculoskeletal symptoms were; wrist/hands 25.8%, elbow 30.7%, shoulder 37.7%, neck 61.9%, upper back 33.2%, lower back 52.9%, hip/thigh 29.9%, knee 32%, and ankle/feet 29.1% which were similar to various studies as Kolkata, India 10 finger 67.5%, wrist 58.7%, elbow 53.3%, neck 54.4%, Germany, 200811 neck 55%, shoulder 38%, hand/wrist 21%, elbow/forearm 15%, Sweden, 200712 Neck and shoulder 46%, Brazil, 200413 Neck/shoulder symptoms 43% and wrist/hand was 39% Denmark, 200414 Elbow, shoulder and low back symptoms were 10%, 18% and 23% respectively. Finland, 200315 Neck, shoulder, elbows, lower arms and wrist and fingers symptoms were 63%, 24%, 18%, 35% and 16% respectively.

Musculoskeletal symptoms were increasing with age OR=2.62 (1.4-5.1), male having more symptoms OR=7.2 (3.6-14.4), job duration more than 2 years had more morbidity OR=2.2 (1.1-4.4), smoker were associated with more symptoms OR=9.4 (3.3-27.2) and professionals, who had better ergonomic score were less morbid OR=0.86 (0.7-0.9).

Ethics Committee Approval

Obtained ethics committee approval

Conflicts of Interest

None

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